

Amendment and Response under 37 C.F.R. 1.116

Applicant: Andrew Harvey Barr

Serial No.: 10/621,925

Filed: July 17, 2003

Docket No.: 200308576-1 (H300.213.101)

Title: ALTERNATING VOIDED AREAS OF ANTI-PADS

REMARKS

The following remarks are made in response to the Final Office Action mailed December 12, 2005. Claims 1-31 were rejected. Claims 1-31 remain pending in the application and are presented for reconsideration and allowance.

Claim Rejections under 35 U.S.C. § 103

The Examiner rejected claims 1-31 under 35 U.S.C. § 103(a) as being unpatentable over the Oggioni et al. U.S. Patent No. 6,710,258.

Applicants submit that the Oggioni et al. patent fails to teach or suggest the invention of independent claim 1. Independent claim 1 includes the limitation “wherein the first voided area does not completely overlap the second voided area.” The Examiner admits that the Oggioni et al. patent does not specifically state that the first voided area does not completely overlap the second voided area. The Examiner submits, however, that the Oggioni et al. patent:

teaches that when the dielectric layers of the PCB are different thicknesses, each of the “anti-pad” can be individually crafted to achieve the desired impedance matching (see col. 4, lines 50 – col. 5, line 20). Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to form the anti-pads in the invention of Oggioni et al. such that the voids do not completely overlap. The motivation for doing so would have been to provide equivalent shielding in layers having different dielectric thicknesses. (Office Action, page 3).

In addition, in the Response to Arguments section, the Examiner states:

However, in this individual crafting it is entirely reasonable that the ordinarily skilled artisan, motivated to satisfy specific requirements (col. 8, lines 35-45) would construct the first and second voided areas to not overlap completely. Moreover, such a modification would also be considered a change of form of the device, and it has been held that more than a mere change of form is necessary for patentability.. Span-Deck, Inc. v. Fab-con, Inc. (CA 8, 1982) 215 USPQ 835. (Office Action, page 8).

Individually crafting the anti-pads to achieve the desired impedance matching does not teach or suggest that the first voided area does not completely overlap the second voided area as recited in independent claim 1. Impedance matching is not affected by the

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overlapping of voided areas. The Oggioni et al. patent figures and text do not provide any indication that the first voided area does not completely overlap the second voided area. Instead, the Oggioni et al. patent figures illustrate that the voided areas are aligned.

In addition, the limitation of independent claim 1 of wherein the first voided area does not completely overlap the second voided area is not merely a change in form, but provides advantages and new and unexpected results not suggested by the Oggioni et al. patent. The invention as recited by independent claim 1 addresses planarity issues associated with anti-pads. For example, with reference to Figure 6:

Partially voided anti-pads 400 and 400' maintain the planarity of the PCB by preventing dielectric material from settling into voids 210 and 210' left when anti-pads 400 and 400' are formed. This is accomplished by leaving some conductive material 200 and 200' behind to support the dielectric material. Modifying the orientation of patterned partially voided anti-pads 400 and 400' from conductive plane 20 to conductive plane 20' provides additional support to maintain board planarity. Anti-pads 400 and 400' are oriented so that void 210 on conductive plane 20 is at least partially supported by conducting material 200' on conductive plane 20'. Stated another way, voided areas 210 and 210' do not completely overlap each other. The surface area of anti-pads 400 and 400' can therefore be increased in size by increasing the amount of conductive material removed. The increased support of the layered structure and the increased voided surface area of anti-pads 400 and 400' reduce the stray capacitance while maintaining board planarity." (Specification, page 8, lines 14-28).

The Oggioni et al. patent does not teach or suggest fabricating the rings to prevent non-planarity of a PCB. Rather, the Oggioni et al. patent is directed to reducing stray capacitance associated with a via-hole without losing the shielding effect provided by the rings. (Abstract). In the Oggioni et al. patent, planarity of the PCB is not listed as a requirement that must be considered when fabricating the rings. Therefore, one skilled in the art would not look to the Oggioni et al. patent for fabricating anti-pads for preventing non-planarity of a PCB. Preventing non-planarity of a PCB is not an expected or inherent result of practicing the Oggioni et al. patent. Accordingly, independent claim 1 is believed to be allowable over the Oggioni et al. patent.

Independent claims 8, 15, and 24 all include the limitation "wherein the first orientation is offset from the second orientation." The Examiner admits that the Oggioni et al. patent does not specifically state that the first orientation is offset from the second orientation. The Examiner provides similar reasons as to the rejection to independent claim 1

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based on the Oggioni et al. patent teaching that when the dielectric layers of the PCB are different thicknesses, each of the anti-pads can be individually crafted to achieve the desired impedance matching.

Similar to reasons discussed above with reference to independent claim 1, individually crafting the anti-pads to achieve the desired impedance matching does not teach or suggest that the first orientation is offset from the second orientation. Impedance matching is not affected by the first orientation being offset from the second orientation as recited in independent claims 8, 15, and 24. The Oggioni et al. patent figures and text do not provide any indication that the first orientation is offset from the second orientation. Instead, the Oggioni et al. patent figures illustrate that the first orientation of the first partially voided anti-pad is aligned with the second orientation of the second partially voided anti-pad, such that the voided areas are aligned.

In addition, as previously discussed above with reference to independent claim 1, the limitations of independent claims 8, 15, and 24 of wherein the first orientation is offset from the second orientation is not merely a change in form, but provides advantages and new and unexpected results not suggested by the Oggioni et al. patent. The invention as recited by independent claims 8, 15, and 24 addresses planarity issues associated with anti-pads. One skilled in the art would not look to the Oggioni et al. patent for fabricating anti-pads for preventing non-planarity of a PCB. Preventing non-planarity of a PCB is not an expected or inherent result of practicing the Oggioni et al. patent. Therefore, independent claims 8, 15, and 24 are believed to be allowable over the Oggioni et al. patent.

Dependent claims 2-7 further define patentably distinct independent claim 1. Dependent claims 9-14 further define patentably distinct independent claim 8. Dependent claims 16-23 further define patentably distinct independent claim 15. Dependent claims 25-31 further define patentably distinct independent claim 24. Accordingly, these dependent claims are also believed to be allowable over the Oggioni et al. patent.

In addition, the Oggioni et al. patent fails to teach or suggest the first and second anti-pads are longer in a first direction than in a second direction (claim 4); wherein the first pattern comprises a screen pattern (claims 14 and 30); wherein the first length and the first width are not equal (claim 16); wherein the second length and the second width are not equal (claim 17); wherein the first length substantially equals the second length and the first width equals the second width (claim 20); wherein the first and second anti-pads are substantially

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oval shaped (claims 21 and 26); and wherein the first orientation is substantially perpendicular to the second orientation (claim 22).

The Oggioni et al. patent states that the arrangement of the via-hole at the center of the rings ensures that no asymmetry is introduced. (Col. 5, lines 49-51). By contrast, the shapes defined in dependent claims 4, (14 and 30), 16, 17, 20 (21 and 26), and 22 introduce asymmetry. In addition, while the Oggioni et al. patent states that the rings may be comprised of square or other polygonal shape frames (col. 6, lines 7-8), the Oggioni et al. patent fails to teach or suggest the defined shapes and/or patterns of dependent claims 4, (14-30), 16, 17, 20, (21 and 26), and 22 that provide new and unexpected results in preventing non-planarity of a PCB.

Further, the Oggioni et al. patent fails to teach or suggest “wherein the first and third orientations are substantially identical and adapted to allow a signal trace between the first and third anti-pads on an adjacent signal plane” as recited by dependent claim 23.

The Oggioni et al. patent does not disclose anti-pads having different orientations or adjacent anti-pads having substantially identical orientations adapted to allow a signal trace between the anti-pads on an adjacent signal plane as recited by dependent claim 23. The orientation of the anti-pads, as defined by dependent claim 23, provides new and unexpected results. For example, with reference to figure 9:

To maintain signal integrity through signal trace 710 on a PCB, signal trace 710 can be placed on a signal layer immediately above or below a non-voided area of conductive plane 20. If signal trace 710 is routed above or below a voided area of conductive plane 20, such as above or below the voided area of anti-pad 600, noise can be introduced into signal trace 710 during circuit operation. If several anti-pads 600 situated close together are formed too large, conductive plane 20 between anti-pads 600 can be choked off which prevents the routing of signal traces 710 between anti-pads 600 on adjacent signal layers. Elongated anti-pads 600 allow signal traces 710 to be routed in at least one direction between anti-pads 600 while still increasing the size of anti-pads 600. (Specification, page 10, lines 11-20).

One skilled in the art would not look to the Oggioni et al. patent for fabricating anti-pads in a manner defined by dependent claim 23 to allow signal traces between the anti-pads on an adjacent signal plane. The fabrication of anti-pads to fulfill this purpose is not an expected or inherent result of practicing the Oggioni et al. patent.

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In view of the above, Applicants respectfully request that the rejections to claims 1-31 under 35 U.S.C. § 103 be withdrawn and that these claims be allowed.

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CONCLUSION

In view of the above, Applicants respectfully submit that pending claims 1-31 are in form for allowance and are not taught or suggested by the cited references. Therefore, reconsideration and withdrawal of the rejections and allowance of claims 1-31 is respectfully requested.

No fees are required under 37 C.F.R. 1.16(h)(i). However, if such fees are required, the Patent Office is hereby authorized to charge Deposit Account No. 08-2025.

The Examiner is invited to contact the Applicant's representative at the below-listed telephone numbers to facilitate prosecution of this application.

Any inquiry regarding this Amendment and Response should be directed to either David A. Plettner at Telephone No. 408-447-3013, Facsimile No. 408-447-0854 or Patrick Billig at Telephone No. 612-573-2003, Facsimile No. 612-573-2005. In addition, all correspondence should continue to be directed to the following address:

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Respectfully submitted,

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CERTIFICATE UNDER 37 C.F.R. 1.8: The undersigned hereby certifies that this paper or papers, as described herein, are being deposited in the United States Postal Service, as first class mail, in an envelope address to: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 13 day of February, 2006.

By 
Name: Patrick G. Billig